



March 2000

# Boyertown Area Farms Site Report

Results of EPA Environmental Assessment

## No Immediate Environmental Threat to Congo, PA Community

### INTRODUCTION

The United States Environmental Protection Agency Region III (EPA) is nearing completion of a Removal Site Evaluation (assessment) of environmental issues in Congo, Pennsylvania, and surrounding communities in western Montgomery County. This fact sheet is a summary of our assessment. It cannot detail the volume of information collected over the last fourteen months. A comprehensive report of EPA's findings is in preparation and will be made available to the public upon completion.

Throughout our assessment, the news media reported the opinions and suspicions of several individuals, along with selected aspects of EPA's assessment. By distributing this fact sheet, we are providing the facts of our assessment directly to the general public. We believe this is especially important to those whose perceived property values and peace of mind may have been impacted by the events of the last fourteen months.

The findings presented in this assessment are well supported. Our assessment has significantly narrowed the focus of what was, initially, a broad evaluation of numerous, sometimes vaguely defined, problems. Throughout our investigation, we examined multiple aspects of each issue presented. Our investigation and findings are independent of any ongoing legal or regulatory matters.

### AN OVERVIEW OF EPA'S ASSESSMENT

In late 1998, three local farmers requested EPA assistance to determine if environmental contaminants were affecting their livestock. EPA responded, in January 1999, by beginning an environmental assessment. The assessment evaluated the potential causes of reportedly mysterious crop damage and dairy cattle ailments, such as poor milk production, lameness, tooth loss, skin lesions, digestive disorders, and deformities, all of which were rumored to be caused by wide-spread industrial pollution. In particular, EPA investigated whether potential releases of hazardous substances could be related to the reported ailments. Most importantly, our assessment evaluated whether elements or compounds detected during our investigation could pose an immediate threat to human health or the environment.

After more than a year of intensive investigation, conducted with the Pennsylvania Department of Environmental Protection (PADEP), EPA finds that the area is neither broadly contaminated nor on the verge of an environmental or public health crisis. Instead, EPA has discovered some very localized areas of concern which affect a relatively small number of properties and individuals. We are continuing to investigate these concerns, as noted in the text that follows.

## EPA'S CONSULTANTS

EPA's findings were reached in collaboration with many agricultural and environmental organizations, in addition to PADEP. Among those consulted were:

- C Agency for Toxic Substances and Disease Registry (ATSDR),
- C Pennsylvania Department of Conservation and Natural Resources (PA DCNR),
- C Pennsylvania Department of Agriculture, Bureau of Animal and Plant Industry,
- C University of Pennsylvania New Bolton Agricultural Center (UPenn - New Bolton),
- C Pennsylvania State University School of Agriculture,
- C Cornell University School of Veterinary Medicine,
- C Montgomery County Health Department, and
- C Penn State Cooperative Extension - Montgomery County.

## FINDINGS ON GROUND WATER

EPA sampled approximately 180 private residential wells near Congo, Pennsylvania. Many of these wells contained boron at higher levels than were typically found in wells in the rest of EPA's study area. Only 11 wells contained levels of boron that rose above EPA's health-based guidelines. These residences are currently being provided bottled water to protect occupants in the event the boron is from a release of hazardous substances into the ground water. (See boron insert)

In addition to boron, a number of residential wells contained an increased amount of fluoride. A few residential wells contained increased amounts of arsenic. The levels of these elements found in the wells do not exceed established drinking water standards.

Many local residents suspect that industry is responsible for the increased levels of boron and fluoride found in area wells. While local industry is a potential source of these compounds, there are also other potential sources. Further investigation will be needed before the source can be determined.

It is possible that the source of increased levels of boron, fluoride, and arsenic in the Congo area is the rock in which most of the affected wells are situated. Boron, fluoride, and arsenic are natural elements. Geological maps of the area show

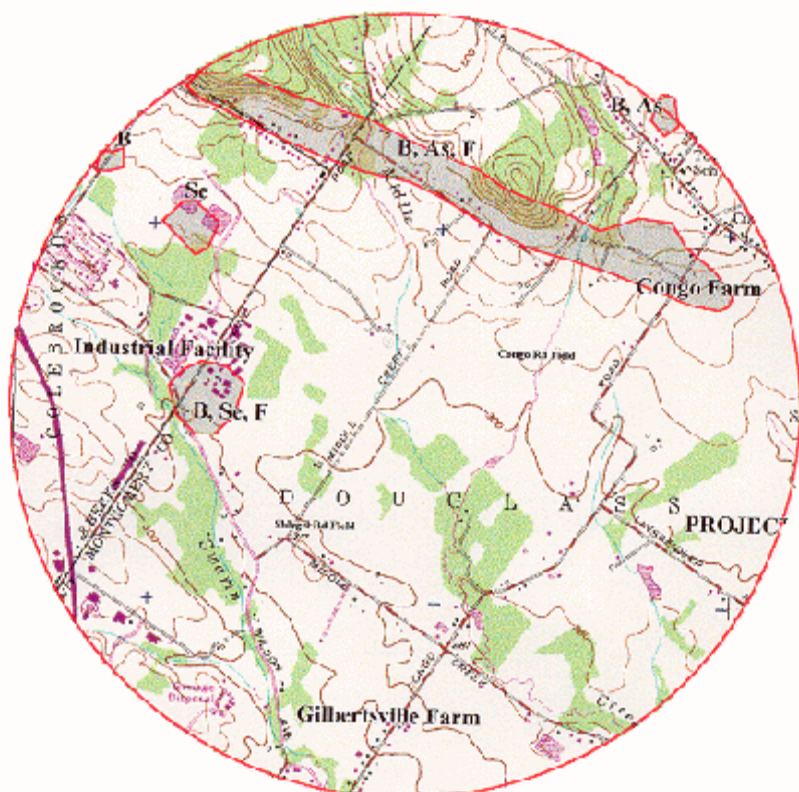
### BORON IS A NATURAL ELEMENT.

It can be found in ground water and in many of the foods we eat, including raisins, honey, ketchup and peanuts. There is no Federal drinking water standard for boron.

Available information suggests that boron concentrations above 800 to 1300 micrograms per liter (ug/l) in drinking water may be too high for children and concentrations in drinking water above 2100 to 3300 ug/l may be too high for adults. (The range varies depending on potential differences in dietary intake and assumes ingestion of one liter (children) and two liters (adults) of water per day.)

that the wells affected by boron and arsenic are primarily situated over a diabase rock formation that differs from the rock formation of the surrounding area. The formation underlying the affected wells is very similar to the formation that underlies Cornwall, Pennsylvania. While there has been little detailed study of Congo-area geology, considerable geologic information is available about the Cornwall area. Minerals containing boron, fluorine (the essential element needed to form fluorides), and arsenic are well documented in the diabase rock at Cornwall and are most likely present at Congo too.

Ground water at the industrial facility on County Line Road is



## SITE MAP

As	Arsenic
B	Boron
F	Fluoride
Se	Selenium

contaminated with boron, fluoride, and selenium, as well as volatile organic compounds, in the area of the facility near Swamp Creek. Ground water in the northern portion of the facility (near the facility impoundments) is primarily contaminated with selenium. Arsenic, which is found at increased levels in some residential wells, is not found at high concentrations in ground water at the facility. The affected residential wells, which are a short distance to the north of the facility (See Figure), do not exhibit selenium at increased levels. The absence of elevated levels of these facility-related substances in the residential wells raises questions about the source of the substances that are present.

At this time, EPA can not rule out the geology or industry as potential sources of the substances in the private wells. We are currently planning to conduct additional well sampling in late March or early April. Samples collected will be analyzed for "finger print" substances which may clearly establish the source.

## FINDINGS ON AIR, SOIL, & VEGETATION

In general, EPA has found that soil within the study area does not pose a concern for human health or the environment. Industry-specific elements were, however, identified in a soil sample taken near the facility in concentrations slightly

above those in all other soil samples.

Agricultural and industrial activities have each contributed to concentrations of fluoride above the average levels that are expected to occur naturally in this area. Fluoride is a component of the phosphate rock mined to produce fertilizer. Consequently, the routine application of fertilizers throughout the study area has affected the concentration of fluoride in the soil. Fluoride is also emitted by the local industrial facility under a permit issued by the Pennsylvania Department of Environmental Protection.

Fluoride concentrations in vegetation near to the industrial facility are

likely to be higher than the concentrations found in vegetation farther away. Because EPA's investigation was conducted during a year of significant drought, which prevented plants from growing vigorously, more sampling may be needed to definitively draw this conclusion and quantify the magnitude of differences in concentrations. However, our findings are in general agreement with existing records.

Visual inspection of vegetation within the study area does not reveal damage resulting from industrial fluoride emissions. With the possible exception of vegetation adjacent to the facility in a down-wind direction, fluoride concentrations in vegetation that may be fed solely to cattle do not reach a level that causes concern. This conclusion is based on clinical observation of several dairy herds in the project area and on the fact that a herd's total diet is comprised of feed from a variety of sources. The fluoride levels in vegetation do not cause harm to humans.

EPA's current evaluation of ambient air near the local industrial facility indicates that hazardous substances either were not detected or were found at levels well below any risk-based levels. Ambient air does not pose a threat to human health. However, additional data will be needed to determine whether air-borne fluoride deposits on vegetation

pose a risk to the environment very near the facility.

## FINDINGS ON DAIRY CATTLE

Ailments in cattle, depicted as mysterious by some community members and media outlets, have been extensively studied. EPA finds that, although there is an increased level of fluoride in the urine and bones of some local cattle, the ailments observed are not the result of exposure to fluoride or any hazardous substances. The conclusions are based on:

- C examination of the cattle and the dairy operations,
- C complete pathology and toxicology results from necropsies (animal autopsies) conducted at Cornell University School of Veterinary Medicine, and
- C diagnostic reports prepared between 1996 and 1999 by the University of Pennsylvania New Bolton Agricultural Center's veterinary laboratory as local cows were submitted for study.

Indications are that the observed ailments are either common in the dairy industry or are caused by farm-specific factors.

Initial analytical data for urine samples from the local cattle showed fluoride concentrations higher than those found in control animals. Because fluoride can pose health risks for cattle at high concentrations, these findings directed us to determine whether the fluoride levels in the study area were having a clinical effect on local cows.

News media reports and some local farmers have stated that dental lesions (brown stains, defects in the enamel, etc.) in cattle indicate fluorosis, a chronic metabolic disease caused by excessive fluoride exposure. However, dental lesions in cattle may result from a number of causes, just as they do in people. Accepted scientific literature indicates that dental lesions are only one of many factors to consider when diagnosing fluorosis. Other indicators of fluorosis include irregular or thickened bone, decreased thyroid function, and decreased immunity.

EPA purchased a total of four cows from two local farms and shipped them to Cornell University's School of Veterinary Medicine in New York. Cornell performed necropsies on the animals and prepared pathology and toxicology reports. The necropsies provided significant information indicating that fluorosis is not prevalent in the animals. Except for dental changes, the necropsies found conditions that were, in fact, opposite to those that indicate fluorosis. The cows

necropsied exhibited thin bones. Their thyroid hormone levels were normal, and they had responsive immune system function. The cows also exhibited muscle atrophy, and depleted fatty reserves. These findings led us to closely examine the possible causes for the observed ailments.

Staining is common in the teeth of dairy cattle and other grazing animals (horses, deer, sheep). It most commonly is from the feed eaten, although it may have many causes. Like stains in human teeth from drinking coffee or using tobacco products, stains can be unsightly without causing damage to the teeth. Tooth loss (shedding of baby teeth) is normal from two to six years of age in cattle. The teeth examined during farm visits were not loose or painful and did not interfere in any way with the cows' ability to eat.

Because EPA and its agricultural consultants were concerned about the possibility of more subtle effects, we considered the overall health of the seemingly afflicted animals. An extensive review of herd health parameters included:

- C milk production and (limited) reproduction records kept by the Pennsylvania Dairy Herd Improvement Association (DHIA) from 1989 to 1999,
- C rations and feeds in use in September 1999,
- C dental examination of cows

in the Congo milking herd and three nearby herds,

- C tabulation of lameness and sore, swollen legs seen in milking cows, and
- C a walk-through examination of young livestock (heifers).

In addition, visits were made to other potentially affected herds in the study vicinity and to a comparably-sized, unexposed herd at Cornell University for comparison purposes.

EPA and our agricultural consultants find that the animal ailments at the farms in question can be directly and/or clinically attributed to common infectious diseases and herd management challenges seen throughout the United States. Following is a summary of EPA's conclusions regarding the specific complaints originally raised by area farmers:

**LAMENESS AND LEG LESIONS** - The Congo-area herd had unusually high rates of lameness and more severe leg lesions than neighboring herds of comparable size with similar housing facilities. Excessive lameness was associated with this farm's practice of intensive confinement (24-hours/day) of the cows in unbedded (hard) tie-stalls. Cows are tethered to the front of the stall and have no daily turn-out to the fields for exercise.

**LOW MILK PRODUCTION** - Data from the Congo herd's DHIA records show no decrease in average milk

production over the last 10 years. Milk production (expressed as the 365-day rolling herd average) has shown at least three cycles of increase and decrease since 1989. Overall, production per milking cow has increased from 45 pounds-per-cow-per-day (lbs./cow/day) in 1989 to 63 lbs./cow/day in 1999. In 1995, this herd briefly achieved 72 lbs./cow/day but soon dropped back to the apparently more sustainable level of 63 lbs./cow/day. The Congo dairy herd continues to lead other local herds in pounds of milk produced, substantiating previously published assertions that the herd is typical to above average for this part of Pennsylvania. The fact that milk production has not increased to a greater extent in this time period may be attributable to management of the feed provided and to poor reproductive success since 1995, as documented by DHIA records.

**EXCESSIVE TOOTH LOSS** - Examination of the Congo herd determined that only normal shedding of temporary (baby) teeth had occurred. Mature animals did not have any missing teeth.

**DEFORMED CALVES AND MISCARRIAGES AMONG CATTLE** - Nationwide, it has been observed that the higher a cow's milk production, the more difficult it is for the cow to

become pregnant. This production-linked phenomenon is well documented. Although farmers reported past deformities and miscarriages to EPA, no documentation of these occurrences was provided for review. Nor could UPenn-New Bolton locate records indicating that deformed or miscarried calves from the Congo farm had been submitted to the diagnostic laboratory. Deformed calves can result from a wide range of causes, including viruses and hereditary defects, but did not appear to be an on-going problem during 1999. Without documentation of past and present occurrences in these herds, EPA cannot comment further on these statements.

**HUMAN HEALTH COMPLAINTS** - At the start of this investigation, EPA received numerous reports of health effects previously experienced by the farmers. Because no documentation of these illnesses was provided for review, EPA cannot comment on them. However, EPA did review Material Safety Data Sheets (MSDS) for the specific herbicides the farmers reported they used during that period. The health effects reportedly suffered by the farmers are listed on the MSDS as potential side effects associated with occupational exposure to the products.

In summary, EPA's investigation found that dairy cattle in the Congo-area herd had fluoride

levels (measured in urine and bone) statistically higher than those found in control animals from an Obelisk, PA, dairy and at the dairy of the University of Pennsylvania. The levels are considered to be non-diagnostic. They fall in the range between nationally accepted "normal" levels and nationally accepted "toxic" levels. Total fluoride ingestion by the Congo herd results from fluoride consumed in commercially purchased feed and mineral supplements, as well as fluoride in locally grown feed and in the ground water. Because fluoride is a naturally occurring element, its presence in each of these dietary items is expected. Scientific opinions about the appropriateness of the "normal" and "toxic" levels associated with fluoride vary. However, EPA's assessment found that clinical observations that could be attributed to increased fluoride ingestion were not clinically significant in the Congo herd animals. The teeth of the Congo herd animals did not differ remarkably from the teeth of unexposed animals examined at the Cornell dairy. Instead, our assessment found that the health and economic productivity of the local herd is most strongly influenced by management challenges and common infectious diseases. EPA has previously shared preliminary observations with specific farm community members who are experiencing difficulty.

## SUMMARY OF INITIAL FINDINGS

**SOIL:** Substances detected in soil within the project area do not pose a significant threat to human health and are not expected to pose a significant threat to the environment. Some substances are elevated due to application of agricultural chemicals. Concentrations of some substances, such as fluoride, are elevated because of both agricultural and industrial operations. Soil near to and southeast of the industrial facility located on County Line Road also contains some industry-specific elements, such as tantalum and niobium, at higher levels than found in other soil samples collected within the study area and expected to result from natural conditions. Concentrations of fluoride in soil are not anticipated to have a significant impact on vegetation.

**GROUND WATER:** A limited area of ground water in the northern portion of the study area contains levels of boron and arsenic higher than found in most wells throughout the study area. Levels of boron in eleven residential wells rise above concentrations that cause EPA to provide an alternative drinking water supply. Bottled water is being provided to these homes in case the boron results from a release of hazardous substances to the

environment. The concentration of fluoride is also increased in some of the wells with increased boron above that found in most wells throughout the study area. It is possible that the source of fluoride, boron and arsenic in ground water within the study area could be either nature (the rock-type in which the affected wells are located) or industry. EPA is continuing to sample ground water in the affected area to determine the source of these elements.

**DAIRY CATTLE:** While fluoride likely contributes to dental staining and increased fluoride in the bone of necropsied cows, EPA finds neither fluoride nor boron are the cause of the significant ailments reported and found in the cattle. Clinically, the cattle do not suffer from chronic fluorosis. Instead, farm-specific factors affect the production of milk, the health of individual animals, and the general condition of the herds. Fluoride in the animals results from several sources including a variety of feed products and the water. The presence of fluoride levels in some animals above the accepted "norm" does not pose a threat to human health through consumption of meat or milk.

**AIR:** Historically, the industrial facility on County Line Road meets its Pennsylvania permit standards. It has, however, exceeded ambient air quality standards for fluoride on occasion at specific facility sampling

locations. Our assessment of this data indicates there is no threat posed to human health. The data suggest that air emissions from the facility likely contribute to an increased concentration of fluoride in vegetation near to the facility.

**VEGETATION:** Vegetation in the project area appears normal. Unusual looking coloration is due to very normal conditions. Analytical data and historic information indicates vegetation near the industrial facility contains elevated concentrations of fluoride which decrease with distance from the facility. Fluoride concentrations do not rise to levels anticipated to result in a substantial threat to cattle. A threat may be posed to livestock if affected vegetation is the primary component of their diet. However, EPA finds that the evaluated herd animals do not suffer from chronic fluorosis and that reported ailments that significantly affect milk production, body condition, animal health, etc., do not stem from increased fluoride ingestion.

**SURFACE WATER/SEDIMENT:** Sampling in Swamp Creek revealed elements likely released from the County Line Road facility through permitted and other sources. Concentrations of these substances do not appear to exceed water quality standards, where standards exists. Standards do not exist for all substances nor for sediment. Stream biota do not appear to be affected based upon recent water

quality inspections by Pennsylvania.

**MISCELLANEOUS:** Radioactive elements or radiation are not present in the study area at unusual or unnatural concentrations.

Unusual human ailments, reported in the past, cannot be definitively resolved. It is plausible the ailments were caused by pesticides in use at the farms.

Pig production problems in the early 1990s cannot be definitively resolved. Farm conditions and disease mechanisms were likely contributing factors in poor production. Potential pesticide introduction can no longer be evaluated.

Corn crop production problems in the early 1990s are likely the result of an application of pesticide that damaged the crops and lingered into at least one additional year. The role of damaged vegetation in pig production problems or human ailments is speculative.

## ADDITIONAL INFORMATION

EPA is currently preparing to conduct additional ground water sampling. The ground water will be analyzed for boron, fluoride and Target Analyte List (TAL) metals which should help EPA to determine the source of the elevated elements.

EPA is also compiling a Report of Findings that will describe the entire farm site assessment in detail.

Upon completion, the report and all supporting information will be placed in the local site file to be located at the Douglass Township Administration Building at 1320 East Philadelphia Avenue in Gilbertsville. In addition, EPA will evaluate the regulatory compliance of the County Line Road industrial facility.

Copies of the original Cornell University pathology and toxicology reports were provided to the farmers; the media; and local officials, and are available to the public for review at the above site file location or at EPA's office at 1650 Arch Street in Philadelphia.

Additional copies of this fact sheet will be available, after April 22, at the administration buildings of Douglass, Washington, and Colebrookdale Townships.

For further information, contact: Carrie Deitzel, Community Involvement Coordinator, at 1-800-553-2509 or at 215-814-5525.

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